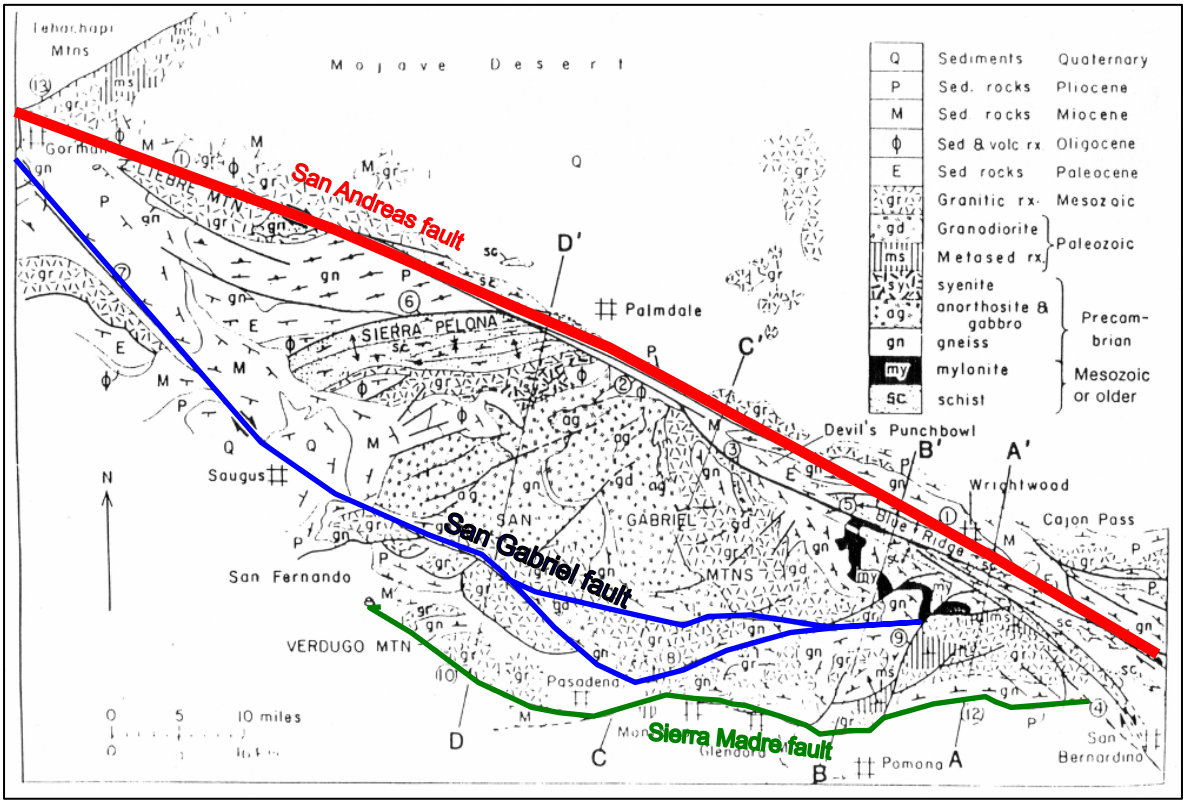
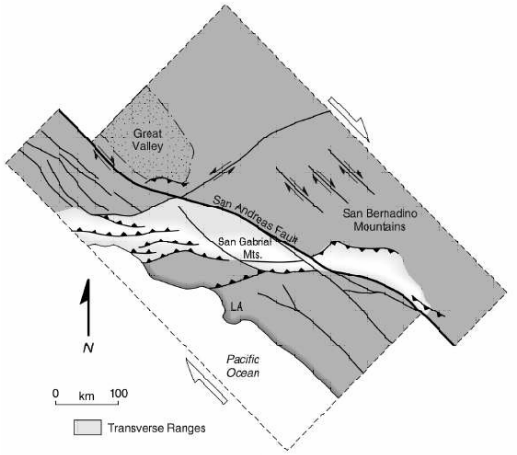
Name: _____

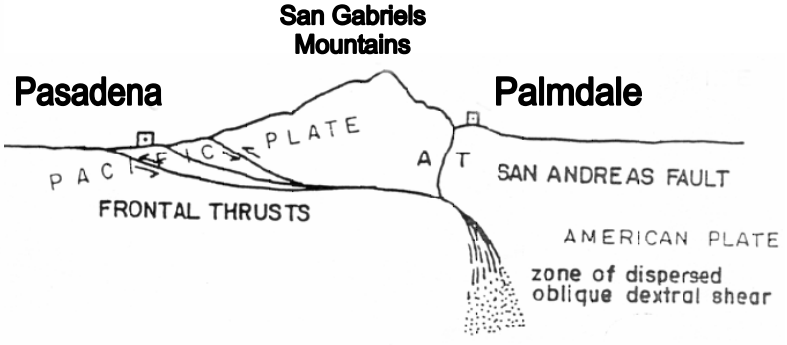
Geology 1 Field Trip – Field Exercises

Background

The San Gabriel Mountains are part of the "transverse range", an east-west belt of mountains thrust up by compression of the crust at a bend in the San Andreas fault. The range is composed of Precambrian (~1.7 Ga) granulite gneiss intruded by Precambrian (~1.2 Ga) anorthosite which in turn is intruded by Mesozoic plutonic rocks (~70 Ma). This basement is overlain by Miocene and later course, clastic sediments. The region's tectonics are dominated by the boundary between the North American and Pacific plates which changed from subduction to transform motion about 30 Ma ago.







STOP 1: Big Tujunga River

I. The Stream

1. What is this stream's source? _____

   What route will it take to the sea? _____

2. Examine several places along the stream. Is sediment being transported now? *Y or N*

   What evidence do you see that the water level of the stream changes over time?

   _____

   _____

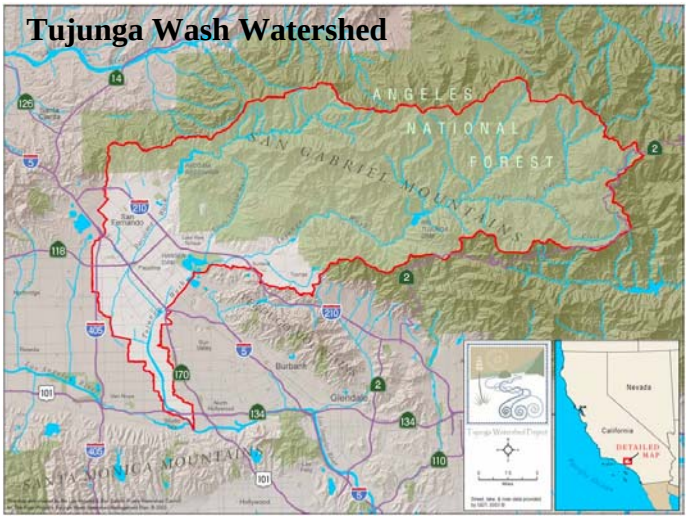
3. How big is the biggest boulder you can find in the streambed? _____ cm

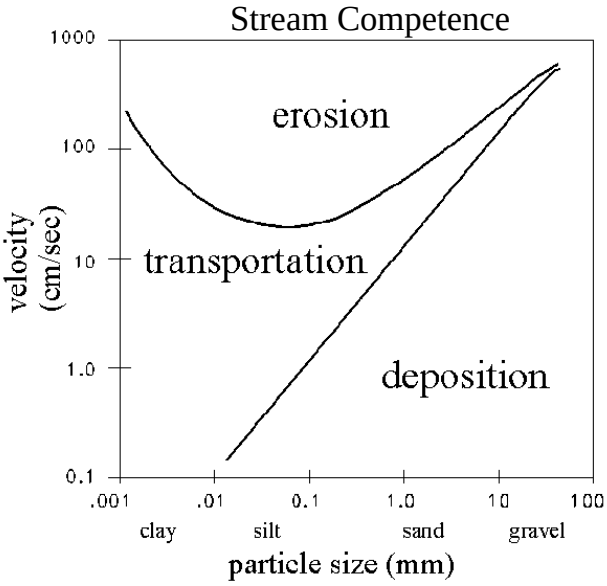
   How fast must the water flow to move this boulder? _____ cm/sec
   (use the "competence" diagram below, you may need to extrapolate)

4. How fast is the water moving now? _____cm/sec

5. When do you think most sediment is transported? _____

   _____





II The Sand

1. Examine the sand in the wash using a hand lens. Describe it as completely as you can. Be sure to include sorting, rounding, grain size, and composition.

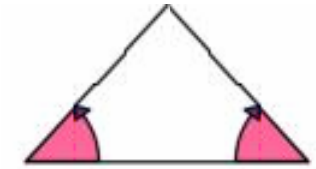
_____

_____

_____

2. What is the *angle of repose* of this sand when dry?

_____



Hint:
- Pile sand as steeply as possible
- Hold clipboard against pile
- Measure angle w/ Brunton

256 mm	Boulders
64 mm	Cobbles
4 mm	Pebbles
2 mm	Granules
1 mm	Very Coarse Sand
1/2 mm	Coarse Sand
1/4 mm	Medium Sand
1/8 mm	Fine Sand
1/16 mm	Very Fine Sand
1/256 mm	Silt
	Clay

III. Instant Rock Collection

Each team will gather an instant rock collection that includes all the rocks in the list below. The individual samples should be between 10cm and 30cm in size. Check off each sample as you find it.

ROCK COLLECTION CHECK LIST

✓	Rock	Description
IGNEOUS		
	granite	phaneritic, orthoclase > plag., accessory minerals (hornblende, biotite, etc.)
	anorthosite	phaneritic, plag., <10% orthoclase, mafics, no quartz, course grayish-purple
	granodiorite	phaneritic, plag. > orthoclase, accessory minerals (hornblende, biotite, etc.)
	diorite	phaneritic, plag., quartz, mafic minerals
	gabbro	phaneritic, mafic minerals, dark (hornblende, augite, olivine), little plag
	basalt	aphanitic, dark gray, red, black
METAMORPHIC		
	quartzite	very hard, finely granular “sugary” texture; gray, yellow, tan, etc.
	marble	softer (scratches w/ knife), usu. visible xls, light color (white, gray)
	schist	sparkly xls, foliated, often fine light/dark bands (micas, garnet, etc.)
	gneiss	granular with light & dark bands, often "wavy"
SEDIMENTARY		
	shale	soft, fine grained, foliated
	sandstone	sand-sized grains, may be foliated
	breccia	angular pebbles in sandy matrix
	conglomerate	rounded pebbles in sandy matrix
OTHER		
	a dike	Find a specimen that has an intrusive dike
	???	Find a rock not on list - try to identify it

STOP 2: Soledad Canyon FWY Cut – Mint Canyon Fm (Upper Miocene, 8-12Ma)

To the north we can see a road cut on the other side of the freeway. In the space below draw a sketch of the geologic units exposed in the cut.

What is this stratigraphic relationship called? _____

What does it tell you about the geological history of this spot? _____

_____

_____

STOP 3: Road Cut – Exercise in Crosscutting Relationships

Sketch this road cut. **!!BE CAREFUL OF TRAFIC!!**

Stop 3: continued

I. Give each different rock unit in the cut a letter: A, B, C, etc. with "A" being the oldest and briefly describe each.

A _____

B _____

C _____

D _____

__ _____

__ _____

II. Describe the sequence of geological events that happened to create the relationships you see in this road cut beginning with the earliest (first). Be as detailed as the evidence allows (but don't make things up). (Note: this story begins ~1.7 billion years ago!)

Deposition of sediment for A, burial, metamorphism of A to granulite gneiss, _____

_____

_____

_____

_____

_____

STOP 4: Vasquez Rocks County Park.

The Vasquez Fm & Mint Canyon Fm (12 –15 Ma) represent >20,000 feet of coarse sediment deposited in the Soledad Basin at the edge of the tectonically active North American continent. The situation is similar to that of growing coastal basins today like the Los Angeles and Ventura basin. 8-15 Ma of earthquake activity on the Elkhorn fault caused the deformation we see today.

What is the strike and dip of the highest hog back (cuestas)? (You'll need a Brunton)

Strike = _____ Dip = _____

Explore the area and find the following:
☐ a **fault** ☐ **graded bedding** ☐ a "**pedestal**" or "mushroom" rock ☐ **lichen**

STOP 5: San Andreas Fault Zone

Look of tell-tale signs of active faulting in this area (see diagram).

As we drive through the road cut try to match the beds and structures on the right side with those on the left.